IN THE CLAIMS

Please amend claims as follows:

1.   (Original) An apparatus for processing a non-interlaced image, comprising:

a wavelet transform unit to perform a two-dimensional discrete wavelet transform of a level higher than or equal to level one on data of the non-interlaced image; and

a determination unit to determine a movement speed of an object within the non-interlaced image based on at least values of wavelet coefficients of a 1LH sub-band of wavelet coefficients obtained by the wavelet transform unit.

2.   (Original) The apparatus as claimed in claim 1, wherein the determination unit performs coding on at least the wavelet coefficients of the 1LH sub-band, and determines the movement speed of the object within the non-interlaced image based on an amount of codes obtained by the coding.

3.   (Original) A method of processing a non-interlaced image, the method comprising :

performing a two-dimensional discrete wavelet transform on the non-interlaced image; and

determining a movement speed of an object within the non-interlaced image based on at least values of wavelet coefficients of a 1LH sub-band of wavelet coefficients obtained by performing the two-dimensional discrete wavelet transform on the non-interlaced image.

4.   (Original) The method as claimed in claim 3, wherein determining the movement speed of the object comprises performing coding on at least the wavelet coefficients of the 1LH

sub-band, and determines the movement speed of the object within the non-interlaced image based on an amount of codes obtained by the coding.

5.   (Original) An apparatus for processing a non-interlaced image, comprising:

a wavelet transform unit to perform a two-dimensional discrete wavelet transform of a level higher than or equal to level one on data of the non-interlaced image; and

a determination unit to divide wavelet coefficients of each of sub-bands obtained by the wavelet transform unit into blocks each having a pixel matrix smaller in size than each sub-band, and to determine a movement speed of an object within the non-interlaced image based on at least coefficient values of each block of a 1LH sub-band.

6.   (Original) The apparatus as claimed in claim 5, wherein the determination unit performs coding on at least wavelet coefficients of the 1LH sub-band and determines the movement speed of the object within the non-interlaced image based on an amount of codes obtained by the coding.

7.   (Original) The apparatus as claimed in claim 5, wherein the determination unit determines the movement speed of the object within the interlaced images based on a unit of the block.

8.   (Original) The apparatus as claimed in claim 7, wherein the determination unit performs coding at least on the wavelet coefficients of the divided blocks of the 1LH sub-band and determines the movement speed of the object within the non-interlaced image based on the unit of the block based on at least an amount of codes of each block of the 1LH sub-band.

9.   (Currently Amended) A method of processing a non-interlaced image, the method comprising:

performing ~~the~~ a two-dimensional discrete wavelet transform on the non-interlaced

image; and

dividing wavelet coefficients of each of sub-bands obtained by performing ~~a~~ the two-

dimensional discrete wavelet transform into blocks each having a pixel matrix smaller in size

than each sub-band, and determining a movement speed of an object within the non-interlaced

image based on at least coefficient values of each block of a 1LH sub-band.

10.   (Original) The method as claimed in claim 9, wherein dividing wavelet

coefficients of each of sub-bands comprises performing coding on at least wavelet coefficients of

the 1LH sub-band and determining the movement speed of the object within the non-interlaced

image based on an amount of codes obtained by the coding.

11.   (Original) The method as claimed in claim 9, wherein dividing wavelet

coefficients of each of sub-bands comprises performing the movement speed of the object within

the non-interlaced image based on a unit of the block.

12.   (Original) The method as claimed in claim 11, wherein dividing wavelet

coefficients of each of sub-bands comprises coding at least on the wavelet coefficients of the

divided blocks of the 1LH sub-band, and determines the movement speed of the object within the

non-interlaced image based on the unit of the block based on at least an amount of codes of each

block of the 1LH sub-band.

13.   (Currently Amended) An image processing apparatus encoding image data of a

non-interlaced image into code data, the non-interlaced image having two successive interlaced

images, the image processing apparatus comprising:

a data reduction unit to reduce an amount of the code data, wherein as a movement speed

of an object in the non-interlaced image increases, ~~wherein~~ the data reduction unit decreases an

amount to be reduced of part of the code data, <u>where</u> the part of the code data affect~~ings~~ reproducibility of an edge part of the non-interlaced image.

14.   (Currently Amended) The image processing apparatus as claimed in claim 13, wherein as the movement speed of the object in the non-interlaced image increases, ~~wherein~~ the data reduction unit decreases an amount to be reduced of part of the code data, <u>where</u> the part of the code data affect~~ings~~ reproducibility of a comb-shaped image offset generated between the interlaced images.

15.   (Original) The image processing apparatus as claimed in claim 13, wherein:

the code data is generated by performing frequency conversion on the image data of the non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency conversion, and performing entropy coding on the quantized coefficients; and

the data reduction unit reduces the amount of the code data by setting a quantization step employed in the quantization to a value larger than a standard value, and as the movement speed of the object in the non-interlaced image increases, reduces a value of the quantization step which value is employed in quantizing coefficients of a high-frequency band.

16.   (Original) The image processing apparatus as claimed in claim 15, wherein a two-dimensional discrete wavelet transform is performed as the frequency conversion.

17.   (Original) The image processing apparatus as claimed in claim 13, wherein:

the code data is generated by performing frequency conversion on the image data of the non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency conversion, and performing entropy coding on the quantized coefficients; and

the data reduction unit reduces the amount of the code data by discarding low-order bit data of the quantized coefficients, and as the movement speed of the object in the non-interlaced

image increases, decreases an amount to be discarded of low-order bit data of coefficients of a high-frequency band.

18.   (Original) The image processing apparatus as claimed in claim 17, wherein a two-dimensional discrete wavelet transform is performed as the frequency conversion.

19.   (Original) The image processing apparatus as claimed in claim 13, wherein:

the code data is generated by performing frequency conversion on the image data of the non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency conversion, and performing entropy coding on the quantized coefficients; and

the data reduction unit reduces the amount of the code data by discarding low-order bit data of the code data, and as the movement speed of the object in the non-interlaced image increases, decreases an amount to be discarded of the low-order bit data of the code data.

20.   (Original) The image processing apparatus as claimed in claim 19, wherein a two-dimensional discrete wavelet transform is performed as the frequency conversion.

21.   (Original) An image processing method encoding image data of a non-interlaced image into code the non-interlaced image having two successive interlaced images, the image processing method comprising:

reducing an amount of the code data, wherein as a movement speed of an object in the non-interlaced image increases, wherein the step of reducing the amount of the coded data decreases an amount to be reduced of part of the code data, the part of the code data affecting reproducibility of an edge part of the non-interlaced image.

22.   (Original) The image processing method as claimed in claim 21, wherein as the movement speed of the object in the non-interlaced image increases, reducing the amount of the

code data decreases an amount to be reduced of part of the code data, the part of the code data affecting reproducibility of a comb-shaped image offset generated between the interlaced images.

23. (Original) The image processing method as claimed in claim 21, wherein:

the code data is generated by performing frequency conversion on the image data of the non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency conversion, and performing entropy coding on the quantized coefficients; and

reducing the amount of the code data reduces the amount of the code data by setting a quantization step employed in the quantization to a value larger than a standard value, and as the movement speed of the object in the non-interlaced image increases, reduces a value of the quantization step which value is employed in quantizing coefficients of a high-frequency band.

24. (Original) The image processing method as claimed in claim 23, wherein a two-dimensional discrete wavelet transform is performed as the frequency conversion.

25. (Original) The image processing method as claimed in claim 21, wherein:

the code data is generated by performing frequency conversion on the image data of the non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency conversion, and performing entropy coding on the quantized coefficients; and

reducing the amount of the code data reduces the amount of the code data by discarding low-order bit data of the quantized coefficients, and as the movement speed of the object in the non-interlaced image increases, decreases an amount to be discarded of low-order bit data of coefficients of a high-frequency band.

26. (Original) The image processing method as claimed in claim 25, wherein a two-dimensional discrete wavelet transform is performed as the frequency conversion.

27.   (Original) The image processing method as claimed in claim 21, wherein:

the code data is generated by performing frequency conversion on the image data of the

non-interlaced image, quantizing coefficients of each of frequencies obtained by the frequency

conversion, and performing entropy coding on the quantized coefficients; and

reducing the amount of the code data reduces the amount of the code data by discarding low-

order bit data of the code data, and as the movement speed of the object in the non-

interlaced image increases, decreases an amount to be discarded of the low-order bit data of the

code data.

28.   (Original) The image processing method as claimed in claim 27, wherein a two-

dimensional discrete wavelet transform is performed as the frequency conversion.

29.   (Original) A motion estimation apparatus, wherein each of frames having

interlaced images forming a moving image is divided into one or a plurality of blocks, and the

frames are hierarchically compressed and encoded into the code stream data by performing

discrete wavelet transform on pixel values block by block, the motion estimation apparatus

comprising:

a sub-block acquisition unit to acquire sub-blocks included in high-frequency sub-bands

block by block from code stream data;

a code amount calculation unit to calculate an amount of codes of each of the acquired

sub-blocks; and

a sub-block motion estimation unit to estimate a motion in each of the sub-blocks based

on the calculated amount of codes thereof.

30.   (Original) The motion estimation apparatus as claimed in claim 29, wherein the

sub-block motion estimation unit estimates the motion in each of a predetermined first one of the

sub-blocks in a 1LH sub-band and a predetermined second one of the sub-blocks in a 1HL sub-band by comparing an amount of codes of the predetermined first one of the sub-blocks and an amount of codes of the predetermined second one of the sub-blocks.

31.   (Original) The motion estimation apparatus as claimed in claim 30, wherein the predetermined first one and the predetermined second one of the sub-blocks are positioned in order to be decoded into a single position.

32.   (Original) The motion estimation apparatus as claimed in claim 29, wherein the amount of codes of each of the sub-bands calculated by the code amount calculation unit is an amount of losslessly compressed codes of each of the sub-blocks.

33.   (Original) The motion estimation apparatus as claimed in claim 29, wherein the amount of codes of each of the sub-blocks calculated by the code amount calculation unit is an amount of codes of each of the sub-blocks before bit truncation.

34.   (Original) The motion estimation apparatus as claimed in claim 29, further comprising a frame motion estimation unit that estimates a motion of each of the frames based on the estimated motion in each of the sub-blocks of the frame.

35.   (Original) The motion estimation apparatus as claimed in claim 34, wherein the frame motion estimation unit estimates the motion of each of the frames based on a ratio obtained as a result of comparison of an amount of codes of a 1LH sub-band and an amount of codes of a 1HL sub-band, the comparison being performed on each of the sub-blocks included in the high-frequency sub-bands by the sub-block motion estimation unit.

36.   (Original) The motion estimation apparatus as claimed in claim 35, wherein the ratio is a ratio of a first group of sub-blocks to a second group of sub-blocks;

a value obtained by dividing the amount of codes in the 1LH sub-band by the amount of codes in the 1HL sub-band is greater than a predetermined value in each sub-block of the first group; and

the value is less than or equal to the predetermined value in each sub-block of the second group.

37.   (Original) A motion estimation method, wherein each of frames having interlaced images forming a moving image is divided into one or a plurality of blocks, and the frames are hierarchically compressed and encoded into the code stream data by performing discrete wavelet transform on pixel values block by block, the motion estimation method comprising:

acquiring sub-blocks included in high-frequency sub-bands block by block from code stream data;

calculating an amount of codes of each of the acquired sub-blocks; and

estimating a motion in each of the sub-blocks based on the calculated amount of codes thereof.

38.   (Original) The motion estimation method as claimed in claim 37, wherein estimating a motion in each of the sub-blocks comprises estimating the motion in each of a predetermined first one of the sub-blocks in a 1LH sub-band and a predetermined second one of the sub-blocks in a 1HL sub-band by comparing an amount of codes of the predetermined first one of the sub-blocks and an amount of codes of the predetermined second one of the sub-blocks.

39. (Original) The motion estimation method as claimed in claim 38, wherein the predetermined first one and the predetermined second one of the sub-blocks are positioned in order to be decoded into a single position.

40. (Original) The motion estimation method as claimed in claim 37, wherein the amount of codes of each of the sub-bands calculated by calculating the amount of codes is an amount of losslessly compressed codes of each of the sub-blocks.

41. (Original) The motion estimation method as claimed in claim 37, wherein the amount of codes of each of the sub-blocks calculated by calculating the amount of codes is an amount of codes of each of the sub-blocks before bit truncation.

42. (Original) The motion estimation method as claimed in claim 37, further comprising estimating a motion of each of the frames based on the estimated motion in each of the sub-blocks of the frame.

43. (Original) The motion estimation method as claimed in claim 42, wherein estimating the motion of each of the frames comprises estimating the motion of each of the frames based on a ratio obtained as a result of comparison of an amount of codes of a 1LH sub-band and an amount of codes of a 1HL sub-band, the comparison being performed on each of the sub-blocks included in the high-frequency sub-bands by estimating the motion in each of the sub-blocks.

44. (Original) The motion estimation method as claimed in claim 43, wherein the ratio is a ratio of a first group of sub-blocks to a second group of sub-blocks;

a value obtained by dividing the amount of codes in the 1LH sub-band by the amount of

codes in the 1HL sub-band is greater than a predetermined value in each sub-block of the first

group; and

the value is less than or equal to the predetermined value in each sub-block of the second

group.

45.   (Original) A computer-readable recording medium storing a program for causing

a computer to execute a motion estimation method, wherein each of frames having interlaced

images forming a moving image is divided into one or a plurality of blocks, and the frames are

hierarchically compressed and encoded into the code stream data by performing discrete wavelet

transform on pixel values block by block, the motion estimation method comprising:

acquiring sub-blocks included in high-frequency sub-bands block by block from code

stream data;

calculating an amount of codes of each of the acquired sub-blocks; and

estimating a motion in each of the sub-blocks based on the calculated amount of codes

thereof.

46.   (Original) The computer-readable recording medium as claimed in claim 45,

wherein estimating the motion in each of the sub-blocks comprises estimating the motion in each

of a predetermined first one of the sub-blocks in a 1LH sub-band and a predetermined second

one of the sub-blocks in a 1HL sub-band by comparing an amount of codes of the predetermined

first one of the sub-blocks and an amount of codes of the predetermined second one of the sub-

blocks.

47.   (Original) The computer-readable recording medium as claimed in claim 46,

wherein the predetermined first one and the predetermined second one of the sub-blocks are

positioned in order to be decoded into a single position.

48.   (Original) The computer-readable recording medium as claimed in claim 45, wherein the amount of codes of each of the sub-bands calculated by calculating an amount of codes is the amount of losslessly compressed codes of each of the sub-blocks.

49.   (Original) The computer-readable recording medium as claimed in claim 45, wherein the amount of codes of each of the sub-blocks calculated by calculating an amount of codes is an amount of codes of each of the sub-blocks before bit truncation.

50.   (Original) The computer-readable recording medium as claimed in claim 45, wherein the motion estimation method further comprises estimating a motion of each of the frames based on the estimated motion in each of the sub-blocks of the frame.

51.   (Original) The computer-readable recording medium as claimed in claim 50, wherein estimating a motion of each of the frames comprises estimating the motion of each of the frames based on a ratio obtained as a result of comparison of an amount of codes of a 1LH sub-band and an amount of codes of a 1HL sub-band, the comparison being performed on each of the sub-blocks included in the high-frequency sub-bands by estimating the motion in each of the sub-blocks.

52.   (Original) The computer-readable recording medium as claimed in claim 51, wherein the ratio is a ratio of a first group of sub-blocks to a second group of sub-blocks;

a value obtained by dividing the amount of codes in the 1LH sub-band by the amount of codes in the 1HL sub-band is greater than a predetermined value in each sub-block of the first group; and

the value is less than or equal to the predetermined value in each sub-block of the second group.

53.   (New) The apparatus as claimed in claim 1, further comprising:

a data reduction unit to reduce the data of the non-interlaced image based on a result of

the determination of the determination unit.